III. $\therefore 11\frac{1}{9}\%$=rate of interest paid.

Solved with varying results by *M. A. Gruber*, *G. B. M Zeer*, *I. R. Baldwin*, *H C. Whitaker*, *H. W. Draughon*, *I. L. Beverage*, and *W. F. Bradbury*. Some of the contributors used compound interest.

14. Proposed by Professor G. B. M. ZERR, A. M., Principal of High School, Staunton, Virginia.

A bank by discounting a note of 7% receives for its money a discount equivalent to $7\frac{3}{4}\%$ interest. How long must the note have been discounted before it was due?

Solution by the Proposer.

$7\frac{3}{4}\%-7\%=\frac{3}{4}\%$. $7\frac{3}{4} : \frac{3}{4}=\$1.00 : \$\frac{3}{31}$, the interest of $1.00 for the required time at 7%.

$\$\frac{7}{100} : \$\frac{3}{31}=12$ months, : $16\frac{128}{217}$ months.

$\therefore$ Time$=16\frac{128}{217}$ months=1 year 4 month $17\frac{151}{217}$ days.

Also solved with different results by *H. C. Whitaker* and *P. S. Berg*.

15. Proposed by O. S. KIBLER, Superintendent of Schools, West Middleburg, Logan County, Ohio.

Supposing the town A to be 30 mi. from B, B 25 mi. from C, C 20 mi. from A, where must a house be erected to be equally distant from each of the towns?

Solution by W. A. GRUBER, War Department, Washington, D. C.

The radius of the circumscribed circle of the triangle formed by drawing AB, BC, and AC, is the *distance* required, and the center of this circle is the *place* for the erection of the house.

From Geometry or Trigonometry, we get

$$R=\frac{abc}{4\sqrt{s(s-a)(s-b)(s-c)}},$$

in which R represents radius of circumscribed circle of a triangle in terms of the sides of triangle.

Substituting for a, b, c, and s $[=\frac{1}{2}(a+b+c)]$, the respective values 25, 20, 30, and $37\frac{1}{2}$, we have

$$R=\frac{25\times20\times30}{4\sqrt{37\frac{1}{2}\times12\frac{1}{2}\times17\frac{1}{2}\times7\frac{1}{2}}}, \text{ which reduced, becomes}$$

$$R=\frac{40}{\sqrt{7}}=\frac{40\sqrt{7}}{7}=15.11857 \text{ mi.}$$

Also solved by *H. C. Whitaker*, *G. B. M. Zerr*, *Seth Pratt*, *J. F. W. Scheffer*, *J. W. Watson*, and *P. S. Berg*.

PROBLEMS.

22. Proposed by E. S. Loomis, A. M., Ph.D., Professor of Mathematics, Baldwin University, Berea, Ohio.

A borrows $1000 from B for 10 years, on which he pays 4% semi-annually.

A immediately loans the $1000 to C for 10 years, who agrees to pay to A $\$12\frac{1}{2}$ on the first of each month for 120 mos. or 10 yrs., at which time the whole debt is considered canceled, C no longer being, in any way, indebted to A. Upon the receipt of each of the $\$12\frac{1}{2}$ payments made by C, A immediately reloans it to D, E, F, etc., upon the same conditions as he loaned the $1000 to C; at the end of 120 mos. all who are indebted to A pay up in full all due him, and he (A) pays B the principal, all interst having been paid when due.

Query: How many dollars has he in hand?

23. Proposed by H. C. Whitaker, Professor of Mathematics, Manual Training School, Philadelphia, Pennsylvania.

A rectangular hall 80 feet long, 40 feet wide and 12 feet high has a spider in one corner of the ceiling. How long will it take the spider to crawl to the opposite corner on the floor if he crawls a foot in a second on the wall and two feet in a second on the floor?

24. Proposed by Mrs. Mary E. Hogsett, Danville, Kentucky.

On January 4, 1889, it was noticed that a clock was 15 minutes fast. On March 1, 1894, it was found to be six and one half minutes slow. When and what time was accurate time?

Solutions to these problems should be received on or before July 1st.

ALGEBRA.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

SOLUTIONS TO PROBLEMS.

11. Proposed by ISAAC L. BEVERAGE, Monterey, Virginia.

Two men, A and B, had a money-box, containing \$210, from which each drew a certain sum daily; this sum being fixed for each, but different for the two. After six weeks, the box was empty. Find the sum which each man drew daily from the box, knowing that A *alone* would have emptied it five weeks earlier than B *alone*,

I. Solution by W. L. HARVEY, Portland, Maine.

Let $x=$ amount B drew out daily, $mx=$ amount A drew out daily.

Then, $\dfrac{210}{x}-\dfrac{210}{mx}=35\ldots.(1)$, and $\dfrac{210}{x(m+1)}=42\ldots.(2)$.

Solving $m=1\frac{1}{2}$, whence $x=\$2$, and $mx=\$3$.

II. Solution by P. S. BERG, Apple Creek, Ohio.

Let $x=$ what A drew out daily, $y=$ what B drew out daily.

Then, $42x+42y=\$210\ldots.(1)$, and $\dfrac{210}{y}-\dfrac{210}{x}=35\ldots.(2)$.

Whence $x=3$, and $y=2$. $\therefore$ A drew out daily \$3, and B \$2.

Also solved by *M. A. GRUBER, H. W. DRAUGHON, H. C. WHITAKER, C. E. MYERS, G. B. M. ZERR, A. L. FOOTE*, and *ROBERT J. ALEY.*

12. Proposed by F. M. SHIELDS, Coopwood, Mississippi.

Three Lads, A, B, and C, each climbed to the top of an upright pole: A's pole was 20 feet high, B's 60 feet, and C's pole was 100 feet high. They all started at the same time, and each climbed up a part of the way, at the same rate of speed per minute, and after each rested five minutes, they ascended to the tops of their respective poles, at the same rate of speed per minute, when they found that each had consumed